

Fuel Cells

Opportunities and Challenges



*Fuel Cells for
Stationary Applications*

September 18, 2000



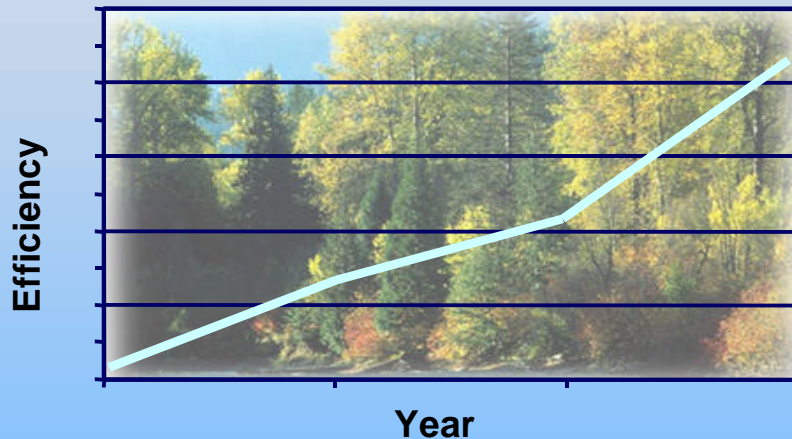
Rita A. Bajura, Director
National Energy Technology Laboratory



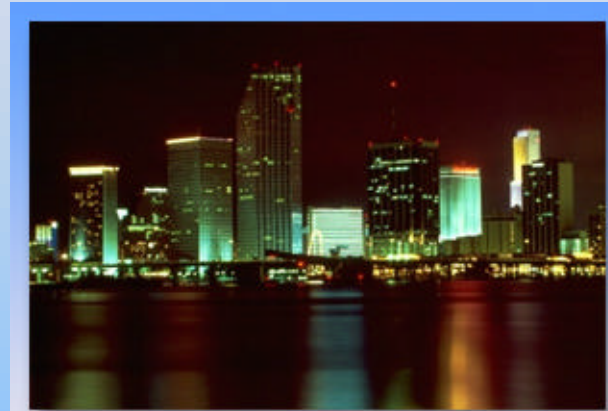
Benefits of Distributed Generation



High Efficiency

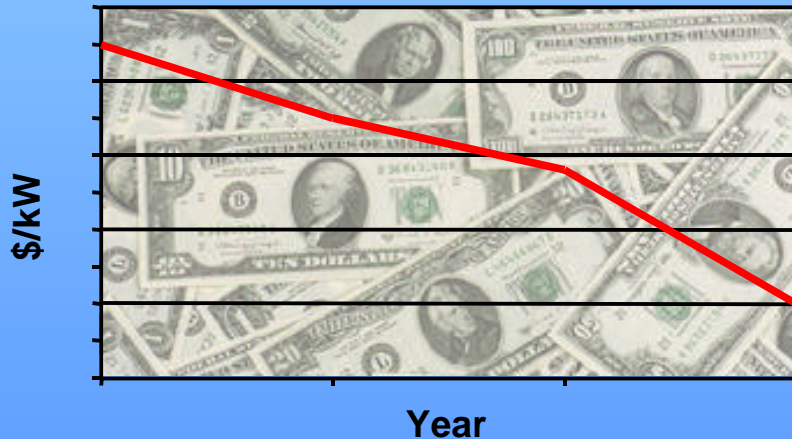


Grid Stability



"Green" Technology

Cost Reduction



Fuel Cells for Distributed Generation



**Fuel Cell
Installation at
a Spokane,
Washington,
Hotel**

Fuel Cell Technologies



- **Phosphoric Acid Fuel Cells (PAFC)**
- **Proton Exchange Membrane (PEM) Fuel Cells**
- **Molten Carbonate Fuel Cells (MCFC)**
- **Solid Oxide Fuel Cells (SOFC)**



Phosphoric Acid Fuel Cells (PAFC)



**ONSI 200-kW PAFC
Being Installed at New York City's Times Square**

Proton Exchange Membrane (PEM) Fuel Cells



NETL's PEM Test Facility



Using PEMs in Residential Building Applications

Molten Carbonate Fuel Cells (MCFC)



Fuel Cell Energy MCFC

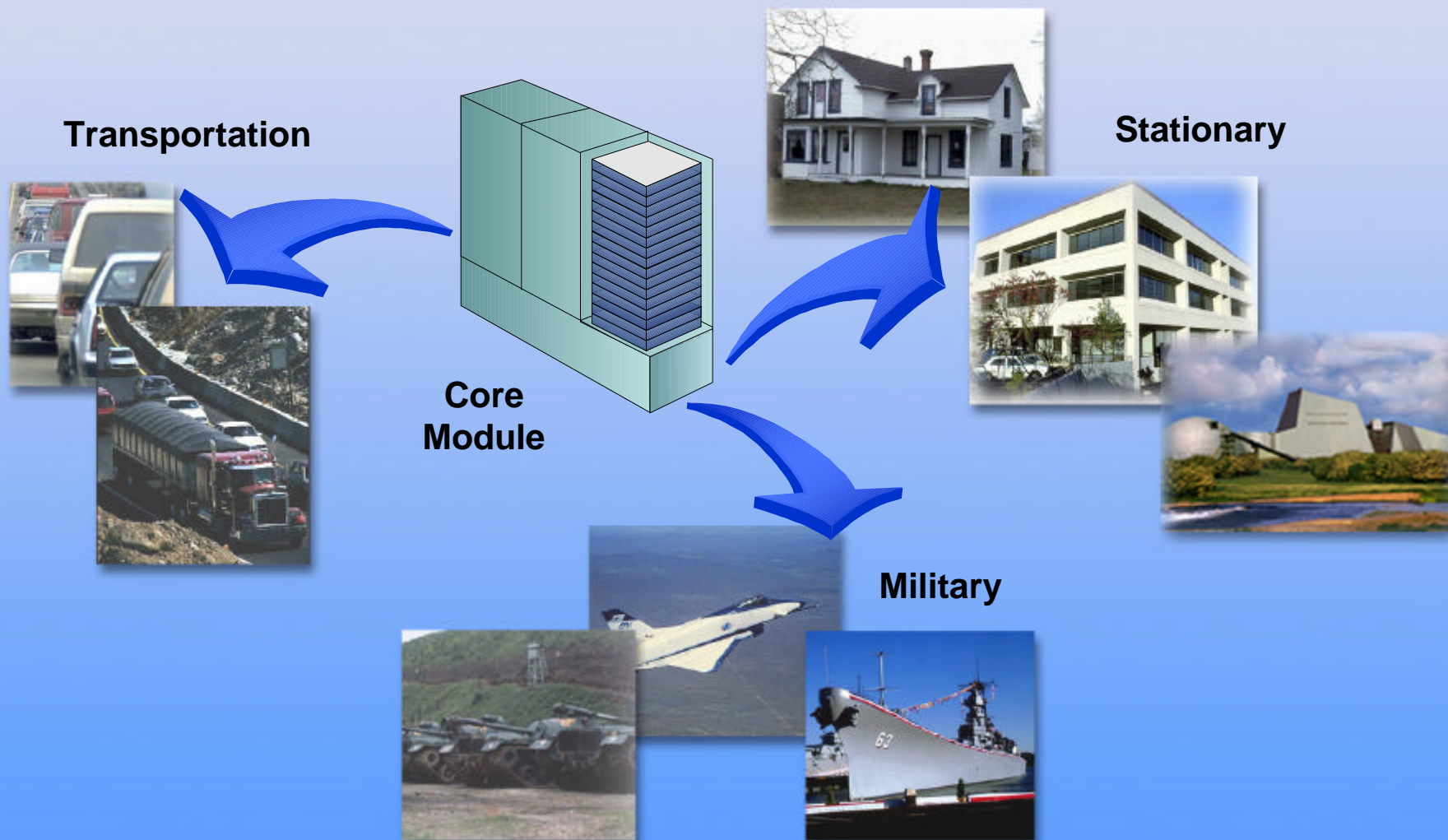
Solid Oxide Fuel Cells (SOFC)



Siemens-Westinghouse SOFC

Solid State Energy Conversion Alliance

A Core Module for Multiple Applications



Responding to the Challenges



- Lower cost fuel cell technologies
- Increasing awareness of fuel cell technology
- Uniform interconnection standards
- Real-time monitoring and control for transmission and distribution

A Vision for the Future



Efficient



“Green” Technology



Quiet and Reliable